

CLAIMS:

Sub C2 1. A recoil buffering apparatus for use with an artillery gun of the type comprising a breech assembly (15) connected to a barrel (12), the breech assembly (15) having a firing mechanism for firing a projectile (60) through an open end of the barrel (12), the recoil buffering apparatus comprising a recoil buffering means adapted to be integrated or otherwise secured to the barrel (12) and movable therewith during recoil action of the barrel (12) caused by firing of the projectile (60), and a support means associated with the recoil buffering means for supporting the recoil buffering means and thereby supporting the barrel (12) and breech assembly (15) through the recoil buffering means.

2. Apparatus according to claim 1 wherein the support means includes a cradle (21), and the recoil buffering means is slidable along the cradle (21).

3. Apparatus according to claim 1 or 2, wherein the support means includes a support platform (31), and one end of the recoil buffering means is directly secured to the support platform (31).

Sub A1 4. Apparatus according to claim 1, 2 or 3, wherein the recoil buffering means comprises a buffering cylinder (17) having a piston (23) attached thereto, the piston (23) being slidable relative to the buffering cylinder (17) and the piston (23) and buffering cylinder (17) being arranged so that sliding movement therebetween provides the buffering action.

5. Apparatus according to claim 4, wherein one end of the buffering cylinder (17) is adapted to be secured to the barrel (12) by means of a yoke (13), and the other end of the buffering cylinder is provided with a guide surface (C) adapted to maintain the barrel (12) and the buffering cylinder (17) in proper alignment.

6. Apparatus according to claim 5, wherein, in use, the barrel (12) and the

buffering cylinder (17) have substantially parallel longitudinal axes.

Sub A2 7. Apparatus according to claim 4, 5, or 6, when dependent upon claim 3, wherein the piston (23) of the recoil buffering means is pivotally secured to the support platform (31).
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8. Apparatus according to claim 4, 5, 6 or 7, when dependent upon claim 2, wherein the buffering cylinder (17) of the recoil buffering means is slidable along the cradle (21)
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9. Apparatus according to claim 8, wherein the cradle (21) includes an aperture within which at least a part of the buffering cylinder (17) is slidably received, and said aperture includes an inner surface which acts to support the buffering cylinder (17).
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Sub A3 10. Apparatus according to any one of claims 4 to 9, wherein the recoil buffering means comprises two of said buffering cylinders (17) and pistons (23).
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11. Apparatus according to claim 10, when dependent upon claim 9, wherein the cradle (21) includes two of said apertures, each aperture receiving a respective one of said buffering cylinders (17).
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12. Apparatus according to any preceding claim, wherein the support means is arranged such that, in use, there is no direct connection between the support means and the barrel (12) or the breech assembly (15).
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13. An elevating apparatus for an artillery gun of the type comprising a breech assembly (15) connected to a barrel (12), the breech assembly (15) having a firing mechanism for firing a projectile through an open end of the barrel (12), the elevating apparatus comprising a support means adapted to support the barrel (12) and breech assembly (12), and an elevating mechanism for raising and lowering
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the barrel (12), wherein the elevating mechanism includes a piston and cylinder (40) which are arranged such that relative movement between the piston and cylinder (40) causes the barrel (12) to be raised or lowered.

5 14. Apparatus according to claim 13, wherein the piston and cylinder are secured to the support means.

Sub A4 15. Apparatus according to claim 13 or 14, wherein the support means includes a cradle (21) adapted to support the barrel (12) directly or indirectly, and at least
10 one support member (22) secured at one end to the cradle (21) and at the other end to a support platform, and wherein the piston and cylinder (40) are secured to the cradle (21) so that they can provide support for the barrel (12) and the breech assembly (15)

15 16. Apparatus according to claims 13, 14 or 15, wherein there are two of said pistons and cylinders (40).

17. Apparatus according to claim 15 and 16, wherein a connecting member (33) is connected between the support platform (31) and each of said pistons and
20 cylinders (40), and a cross-connecting member (36) is connected between said pistons and/or between each of said cylinders (40).

18. Apparatus according to claim 17, wherein the arrangement of the pistons and cylinders (40), the connecting members (33) the cross-connecting member
25 (36) and the or each support member (22) is substantially tetrahedral.

Sub C3 19. A traversing apparatus for an artillery gun comprising a breech assembly (15) connected to a barrel (12), the breech assembly (15) having a firing mechanism, for firing a projectile through an open end of the barrel (12), the
30 traversing apparatus comprising: a support platform (31) which is adapted to support the barrel and breech assembly in such a manner that said barrel (12) and

breech assembly (15) may rotate relative to the support platform (31) in order to impart a traversing motion to the barrel and breech assembly, the support platform including an arcuate guide member having support means adapted to support the barrel (12) and breech assembly (15) so that the support means follows the guide member during said traversing motion of the barrel (12) and breech assembly (15); and drive means secured to the support means and adapted to drive movement of the support means along the guide member to cause said traversing motion, wherein the drive means comprises a drive wheel (38) and a drive cable (39) wrapped around the drive wheel or in connection therewith, the drive cable being substantially fixed relative to the guide member so that rotation of the drive wheel (38) causes the drive wheel (38) to be driven along the guide member.

20. Apparatus according to claim 19, wherein the drive cable (39) sits in a recess provided in the drive wheel (38).

21. Apparatus according to claim 19, wherein the recess in the drive wheel (38) extends around the drive wheel (38) in a substantially helical fashion.

22. Apparatus according to claim 19, 20 or 21, wherein tensioning means is provided to maintain the drive cable (39) in tension.

23. Apparatus according to claim 19, 20, 21 or 22, wherein the drive cable (39) extends at least partly around the guide member

24. Apparatus according to any one of claims 19 to 23, wherein the support means includes at least one support member adapted to support the barrel (12) and the breech assembly (15).

25. Apparatus according to claim 24, wherein the or each support member includes a mechanism, for adjusting the elevation of the barrel (12).

Sub A6
26. Apparatus according to any one of claims 19 to 25 wherein the guide member is provided with a T-shaped recess, and the support means is provided with a formation adapted to engage the recess, thereby guiding movement of the support means along the guide member.

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Sub C4
27. An elevating apparatus for an artillery gun of the type comprising a breech assembly (15) connected to a barrel (12), the breech assembly (15) having a firing mechanism for firing a projectile through an open end of the barrel (12), the elevating apparatus comprising three base members ³³(34, 36) disposed in a substantially triangular arrangement, and three support members (22,40) arranged to support the artillery gun, wherein at least one of the support members (40) is extendible to vary the elevation of the artillery gun, and wherein the base members ³³(34,36) and the support members (22,40) are disposed in a substantially tetrahedral arrangement.

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28. An elevating apparatus according to claim 27, wherein two of the support members (40) are extendible.

Sub A7
29. An elevating apparatus according to claim 27 or 28, wherein the or each extendible support member comprises a piston and cylinder arrangement.

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30. An artillery gun comprising a breech assembly (15) connected to a barrel (12), the breech assembly (15) having a firing mechanism for firing a projectile through an open end of the barrel (12), and further comprising a recoil buffering apparatus according to any one of claims 1 to 12, an elevating apparatus according to any one of claims 13 to 18 or claims 27 to 29, and/or a traversing apparatus according to any one of claims 19 to 26.

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31. An artillery gun according to any one of the preceding claims, wherein the artillery gun is platform or vehicle mounted.

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32. An artillery gun according to any one of the preceding claims, wherein the artillery gun is a mortar gun.

33. An artillery gun according to claim 30, wherein the artillery gun is a mortar gun, and wherein the barrel (12) includes a muzzle brake (11) through which projectile propellant gas can escape from the barrel (12).

34. A mortar gun comprising a breech assembly (15) connected to a barrel (12), the breech assembly (15) having a firing mechanism for firing a projectile through an open end of the barrel (12), wherein the barrel (12) includes a muzzle brake (11) through which projectile propellant gas can escape from the barrel (12).

35. A mortar gun according to claim 34, wherein the muzzle brake (11) is disposed adjacent the open end of the barrel (12).

36. A mortar gun according to claim 34 or 35, wherein the muzzle brake (11) comprises a plurality of apertures provided in the barrel (12).

37. A mortar gun according to any one of claims 34 to 36, further comprising a recoil buffering apparatus according to any one of claims 1 to 12, an elevating apparatus according to any one of claims 13 to 18 or 27 to 29, and/or a traversing apparatus according to any one of claims 19 to 26.

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